Priority

The Examiner stated that the Applicant has not filed the priority documents referenced in Applicant's letter of February 14, 2000. Applicant submits that the priority documents in question were filed with the letter of February 14, 2000. Since the Examiner stated that the priority documents are not in the file wrapper, it appears that the priority documents have been lost in the U.S. Patent Office. Therefore, copies of the missing priority documents are submitted herewith.

Objections to the Drawings

Withdrawal of the objection to the drawings as containing informalities is requested. Applicant proposes to correct the informalities cited by the Examiner as shown in the attached proposed Drawing Corrections.

The several views originally shown in Figs. 13A and 13B have been corrected to be shown in Figs. 13A-13E. The sectional lines in Fig. 3 have been properly drawn and labeled to indicate the views shown in Figs. 4-6. The exploded views shown in Fig. 10A, Fig. 10B and Fig. 11A have each been embraced by a bracket.

Amendments to the Specification

The specification has been amended as indicated above to comply with the attached Drawing Corrections, and to correct grammatical and typographical errors.

Applicant believes that the specification is now in good order.

Claim Rejections-35 U.S.C. §112, Second Paragraph

Withdrawal of the rejection of claims 1-15 under 35 U.S.C. § 112, is requested. Claims 1-15 have been amended to correct the language rejected by the Examiner, as well as additional informalities and grammatical errors.

The Examiner stated that the term "tubule member" in line 4 of claim 8 is indefinite. The term "capillary" replaces the term "tubule member" in amended claim 8. Support for the term "capillary" is found on page 18 of the specification at line 8 of the second paragraph.

Claim Rejections - 35 U.S.C. §102

Withdrawal of the rejection of claims 1, 3, 5, 8, 9, 11-13 and 15 under 35 U.S.C. §102(e) as being anticipated by Hashimoto et al. (USP 5,918,976), is requested.

In order for anticipation to exist, a reference must teach each and every element of a claimed invention. "The identical invention must be shown in as complete detail as is contained in the… claim". Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

supl #115 chem tx not pos part of clm & is obvious

Claim 1, as amended, recites a chemical supply system comprising a piping system in which said solvent flows "without circulation". Claim 1 further states that a mixture solution is supplied from a discharge portion of the piping system to a chemical treatment chamber. Support for these limitations is provided in Fig. 1 and in the specification on page 17.

Hashimoto et al. teaches a system in which solvent circulates through a flow passage in a circulation route and a liquid chemical is supplied to the flow passage to form a mixture. Furthermore, the mixture solution in Hashimoto et al. is not supplied to a chemical treatment chamber. Hashimoto et al. therefore does not teach the claimed invention, which claims a piping system in which solvent flows without circulation and claims supplying a mixture solution to a chemical treatment chamber.

Since Hashimoto et al. does not teach all of the limitations of claim 1, Hashimoto et al. does not anticipateclaim 1. Claims 3, 5, 8, 9, 11-13 and 15 depend from claim 1 either directly or indirectly. Thus, Hashimoto et al. also does not anticipate claims 3, 5, 8, 9, 11-13 and 15.

Withdrawal of the rejection of claims 1, 8, 9, 12 and 15 under 35 U.S.C. §102(b) as being anticipated by Rodgers et al. (USP 4,664,528), is requested.

The chemical supply system of claim 1 supplies a mixture solution comprising a liquid chemical mixed and diluted with a solvent to a chemical treatment chamber.

Rodgers et al. teaches a chemical mixing system merely mixes water and a water-soluble emulsion polymer, and does not supply the mixture to a chemical treatment chamber. Thus, Rodgers et al. does not teach the claimed invention, in which a mixture solution comprising a liquid chemical mixed and diluted with a solvent is supplied to a chemical treatment chamber.

Since Rodgers et al. does not teach all of the limitations of claim 1, Rodgers et al. does not anticipate claims 1, 8, 9, 12 and 15. Reconsideration and withdrawal of the rejection is therefore respectfully requested.

Withdrawal of the rejection of claims 1, 3, 8, 12, 13 and 15 under 35 U.S.C. §102(b) as being anticipated by Cadeo et al. (USP 4,964,732), is requested.

In addition to the elements of claim 1 discussed above, claim 1 states that the liquid chemical is stored in a chemical reservoir at a high concentration.

Cadeo et al. teaches a chemical mixing system in which individual liquids circulate within respective individual circulation paths until the flow rates of the liquids reach predetermined values. After the predetermined flow rate values are reached, the individual liquids are mixed together. Cadeo et al. does not teach a liquid chemical stored at a high concentration and does not discuss forming a mixture including the liquid chemical mixed and diluted with a solvent. Furthermore, since Cadeo teaches that each individual chemical circulates within an individual circulation path, Cadeo et al. does not teach a solvent flowing <u>without</u> circulation as required by claim 1.

Since Cadeo et al. does not teach all of the limitations of claim 1, Cadeo et al. does not anticipate claims 1, 3, 8, 9, 12, 13 and 15. Reconsideration and withdrawal of the rejection is therefore respectfully requested.

Withdrawal of the rejection of claims 1, 8-10, 13 and 15 under 35 U.S.C. §102(b) as being anticipated by O'Dougherty et al. (USP 5,522,660), is requested.

O'Dougherty et al. teaches a chemical mixing system in which solvent circulates in a circulation path and a liquid chemical is supplied to the circulation path. After the two liquids have been mixed together, the resultant mixture is drained out of the system. O'Dougherty therefore does not teach a chemical mixing system in which solvent flows in a piping system <u>without</u> circulation, and does not teach supplying the mixture to a chemical treatment chamber.

Since O'Dougherty et al. does not teach all of the limitations of claim 1, O'Dougherty et al. does not anticipate claims 1, 8-10, 13 and 15. Reconsideration and withdrawal of the rejection is therefore respectfully requested.

Withdrawal of the rejection of claims 1, 3, 8, 9 and 13-15 under 35 U.S.C. §102(e) as being anticipated by Suzuki et al. (USP 5,800,056), is requested.

Claim 1 recites a chemical supply system including a piping system in which a solvent flows without circulation and a chemical supply means for sucking a predetermined quantity of a liquid chemical from a chemical reservoir and feeding the solvent with the liquid chemical, wherein a necessary quantity of the liquid chemical is mixed with the solvent flowing in the piping system and a mixture solution is produced at a described concentration, wherein the piping system includes a discharge portion for the mixture solution at an end portion thereof, and wherein the mixture solution is supplied from the discharge portion to a chemical treatment chamber.

Suzuki et al. discloses a mixing system in which a diluent is supplied to a preparation vessel from a diluent supply unit and a solution is supplied to the preparation vessel from a solution supply unit. The diluent and solution are mixed together in the preparation unit. Therefore, Suzuki et al. does not teach a liquid chemical mixed with a solvent flowing in a piping system, and does not teach a piping system in which solvent flows and which has a discharge portion for supplying a mixture to a chemical treatment chamber, as set forth in claim 1. Suzuki et al. also does not teach supplying the mixture formed in the preparation unit to a

chemical treatment chamber.

Since Suzuki et al. does not teach all of the limitations of claim 1, Suzuki et al. does not anticipate claims 1, 3, 8, 9 and 13-15. Reconsideration and withdrawal of the rejection is therefore respectfully requested.

<u>Claim Rejections – 35 U.S.C. §103</u>

Withdrawal of the rejection of claim 5 under 35 U.S.C. §103(a) as being unpatentable over Rodgers et al., Cadeo et al., O'Dougherty et al. or Suzuki et al. in view of Pawloski et al. (USP 3,738,815), is requested.

The rejection states that Pawloski et al. teaches a chemical processing system including a piping loop 10, a pump 20 in the piping loop and a cooling means 32 provided about the piping and proximate the pump. The rejection asserts that it would have been obvious to one of ordinary skill in the art to have provided the systems of Rodgers et al., Cadeo et al., O'Dougherty et al. and Suzuki et al. with a cooling means to cool the pump and piping.

In order for a claimed invention to be obvious, all of the claim recitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA/974). Furthermore, in order to establish a prima facie case of obviousness, the prior art must provide some motivation to make the claimed invention. In re Vaeck, 947 F.2d 488, 493, 20 USPQ2d 1438, 1442.

Rodgers et al., Cadeo et al., O'Dougherty et al. and Suzuki et al. do not teach the chemical supply system of base claim 1 for the reasons stated above. Pawloski et al. also does not teach the elements of base claim 1 that are missing from Rodgers et al., Cadeo et al., O'Dougherty et al. and Suzuki et al. Since the references fail to show all the limitations of claim 5, no possible combination of the references could suggest the subject matter of claim 5. Therefore, claim 5 is not rendered obvious by the combination made by the Examiner.

Furthermore, there is no motivation to combine the cooling means of Pawloski et al. with the systems of Rodgers et al., Cadeo et al., O'Dougherty et al. or Suzuki et al to arrive at the present invention. The cooling means of Pawloski is provided to maintain the temperature of a reactor and to promote the reaction of chemicals in the reactor. On the other hand, the cooling means of the present invention is intended to prevent the liquid chemical from vaporizing and accumulating in the pump. Since the Pawloski et al. cooling means addresses a completely different problem than the cooling means of the present invention, there is no motivation to use the cooling means of Pawloski et al. in the systems of Rodgers et al., Cadeo et al., O'Dougherty et al. or Suzuki et al. to produce the claimed invention. Reconsideration and withdrawal of the rejection is respectfully requested.

Withdrawal of the rejection of claim 7 under 35 U.S.C. §103(a) as being unpatentable over Rodgers et al., Cadeo et al., O'Dougherty et al. or Suzuki et al. in view of Shibata et al. (USP 4,787,921), is requested.

The rejection states that Rodgers et al., Cadeo et al., O'Dougherty et al. and Suzuki et al. do not disclose a degassing tube. The rejection states that Shibata et al. discloses a degassing tube with a degassing membrane 4 used in chemical processing systems, and that it would have been obvious to one of ordinary skill in the art to have provided the systems of Rodgers et al., Cadeo et al., O'Dougherty et al. and Suzuki et al. with a degassing tube as disclosed by Shibata et al. for the purpose of removing gaseous components contained in liquids.

Rodgers et al., Cadeo et al., O'Dougherty et al. and Suzuki et al. do not teach the chemical supply system of base claim 1 for the reasons stated above. Shibata et al. also does not teach the elements of base claim 1 that are missing from Rodgers et al., Cadeo et al., O'Dougherty et al. and Suzuki et al. Therefore, claim 7 is not rendered obvious by the combination made by the Examiner. Reconsideration and withdrawal of the rejection is respectfully requested.

Allowable Subject Matter

The Examiner indicated that claims 2 and 4 would be allowable if rewritten to overcome the rejection under 35 U.S.C. §112 and to include all of the limitations of the base claim and any intervening claims. Applicant thanks the Examiner for the indication of allowable subject matter.

Conclusion

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue.

Dated: October 3, 2002

Respectfully submitted,

By ______

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MARKED-UP REVISIONS

IN THE SPECIFICATION:

Page 12, paragraph 4 should read

Fig. 4 is a schematic sectional view taken along [one-dot chain] line [I-I'] 4-4 in Fig. 3;

Page 12, paragraph 5 should read

Fig. 5 is a schematic sectional view taken along [one-dot chain] line [II-II'] 5-5 in Fig. 3;

Page 12, paragraph 6 should read

Fig. 6 is a schematic sectional view taken along [one-dot chain] line [III-III'] 6-6 in Fig. 3;

Page 13, paragraph 4 should read

Figs. 13A [and 13B] through 13E are typical views showing chemical diffusion patterns at a mixing point of a liquid chemical and ultrapure water;

Page 25, paragraph 2 should read

Figs 13A [and 13B] through 13E are typical views showing chemical diffusion patterns at a mixing point P of a liquid chemical and ultrapure water in this example.

Pages 25-26, paragraph 3 should read

First, as a comparative example, a chemical diffusion pattern when the connecting tube 32 is directly connected to the piping system 23 without using capillary 33, is shown in Fig. 13A and Fig. 13B. In this case, because the linear velocity of ultrapure water is larger than the linear

velocity of the liquid chemical, laminar flow of ultrapure water is not disturbed and the liquid chemical is transported along the tube wall as it is in the non-diffusion state.

Page 26, paragraph 1 should read

In comparison with that, in case of this example, as shown in [Fig. 13B] Figs. 13C-13E, by selecting the capillary 33, by applying a pressure at which that the linear velocity of the liquid chemical discharged from the capillary 33 is sufficiently larger than the linear velocity of ultrapure water (for example, the pressure at which it is injected at the flow velocity about ten times of the flow velocity of ultrapure water), to the liquid chemical by the chemical supply pump 31, the liquid chemical reaches the opposite wall surface of the piping system 23 in ultrapure water. The chemical diffusion pattern at this time has a shape elongated in the flowing-out direction by laminar flow in viewing from the side, a shape such that the tip end of the chemical flow is separated to both sides by collision against the opposite wall surface and further elongated in the flowing-out direction, in viewing from the upside. That is, in this case, a mixture solution (cleaning liquid) of the liquid chemical and ultrapure water is compounded at a uniform concentration and transported through the piping system 23.

IN THE CLAIMS:

- inter use

1. (Amended) A chemical supply system for supplying a mixture solution[in which] to a chemical treatment chamber, wherein said mixture solution includes a liquid chemical [is] mixed and diluted with a solvent, [characterized by] said chemical supply system comprising:

Solvent - water

at least one [kind of] chemical reservoir that is easy to carry, [in which] wherein said liquid chemical is stored in said chemical reservoir at a high concentration [is stored,];

comb subcomb

[a chemical supply means for sucking a predetermined quantity of said liquid chemical from said chemical reservoir and feeding out it, and]

a piping system [forming a flow passage for said solvent connected to said chemical supply means] in which said solvent flows without circulation, wherein said piping system

support 112, 2nd

includes [and having] a discharge portion for said mixture solution at an end portion[,] thereof; and

a chemical supply means for sucking a predetermined quantity of said liquid chemical from said chemical reservoir and feeding said solvent with said liquid chemical, wherein[, at the time of use] a necessary quantity of said liquid chemical is mixed with said [solution] solvent flowing in said piping system[,] and said mixture solution is produced at a described concentration [is produced], and wherein said mixture solution is supplied from said discharge portion to said chemical treatment chamber.

Not previously

2. (Amended) [A chemical supply system described in] The chemical supply system of claim 1, [characterized in that] wherein:

said chemical supply means is a chemical supply pump [in which] including a flow passage for passing a predetermined liquid chemical [is formed,];

a suction valve which is closed by a pressure rise of said liquid chemical is provided at a flowing-in port of said flow passage, and a discharge valve which is closed by a pressure fall of said liquid chemical is provided at a flowing-out port of said flow passage[,];

said flow passage includes a liquid contact surface, at least part of which [a liquid contact surface in said flow passage] is made of a compact member with non-permeability and a high anti-corrosion property with respect to said liquid chemical, [and] part of said compact member [is] being made into a movable wall[,]; and

a shaker is connected to said movable wall, [is provided, and] said movable wall [is] being oscillated in a direction substantially perpendicular to [its] a surface of the movable wall [surface] by [drive] driving said shaker to periodically change the volume of said flow passage [periodically].

3. (Amended) [A chemical supply system described in] The chemical supply system of claim 1, [characterized in that] wherein said chemical supply means comprises:

a first pump for feeding out said liquid chemical from said chemical reservoir, and

a second pump [of pushing-out type by gas pressure] for storing said liquid chemical fed out from said first pump and supplying a predetermined quantity of said liquid chemical to said piping system by applying a predetermined pressure to said liquid chemical for a predetermined time.

4. (Amended) [A chemical supply system described in] The chemical supply system of claim 3, [characterized in that] wherein said second pump comprises:

a chemical storage means in which said liquid chemical is stored[,];

a pressure control means for performing pressure control by feeding a gas to said liquid chemical in said chemical storage means[,]; and

a liquid level measurement means for measuring a change in liquid quantity of said liquid chemical in said chemical storage means, wherein said pressure control means is controlled on the basis of a measurement result of said liquid level measurement means, and wherein a predetermined quantity of said liquid chemical is supplied to said piping system.

5. (Amended) [A chemical supply system described in] The chemical supply system of claim 1, [characterized in that] wherein said chemical supply means is a pump, said chemical supply system further comprising a cooling means for cooling [the] an interior of said pump [of said chemical supply means] and [the] an interior of a piping portion between said chemical reservoir and said pump [chemical supply means relatively] relative to a [the chemical] temperature of the liquid chemical[, is provided].

6. (Amended) [A chemical supply system described in claim 1, characterized in that] The chemical supply system of claim 3, wherein said MA? shaker is controlled [controls] such that the absolute value of a negative pressure at the time of sucking said liquid chemical in one period of oscillation is as small as possible and [the] suction time is longer than [the] discharge time when

[it] said shaker oscillates and drives said movable wall.

7. (Amended) [A chemical supply system described in claim 1, characterized in that] The chemical supply system of claim 1, further comprising a degassing tube [whose surface layer is a degassing membrane is provided] disposed between said chemical reservoir and said chemical supply [pump] means, wherein said degassing tube includes a surface layer that is a degassing membrane, wherein said liquid chemical is passed through said degassing tube in a state that [the] an external pressure of said degassing tube is lower than [the] an internal pressure of said degassing tube, and degassing of said liquid chemical is performed.

8. (Amended) [A chemical supply system described in claim 1, characterized in that] The chemical supply system of claim 1, further comprising:

a connecting flow passage connecting said piping system and said chemical supply means [is provided]; and

a [tubule member] capillary disposed in said connecting flow passage and directly connected to said piping system [to be a discharge portion] for discharging said liquid chemical [to] into said solvent.

9. (Amended) [A chemical supply system described in claim 1, characterized by comprising] The chemical supply system of claim 1, further comprising a control system for regulating said mixture solution supplied from said discharge portion.

10. (Amended) [A chemical supply system described in claim 9, characterized by comprising] The chemical supply system of claim 9, further comprising:

a flow rate regulation means for regulating [the] a flow rate of said solvent or said liquid chemical passing through said piping system[, and];

a concentration regulation means for regulating [the] a concentration of said mixture solution passing through said piping system[,]; wherein said control system has a chemical

supply control means for regulating [the] a supply quantity of said liquid chemical to said solvent of said chemical supply [pump] means, [and] wherein said control system has a concentration control means for driving said concentration regulation means, wherein said chemical supply control means drives said flow rate regulation means, wherein said chemical supply control means and said concentration control means are connected, and wherein a result of concentration control by said concentration control means is fed back to said chemical supply control means to regulate the supply quantity of said liquid chemical.

11. (Amended) [A chemical supply system described in claim 1, characterized by comprising] The chemical supply system of claim 1, further comprising a mixing means for producing a rotational flow in said mixture solution to stir and uniformize said mixture solution;

wherein said mixing means has a spiral pitch in a flow passage for said mixture solution, and a rotational flow is produced by said mixture solution passing through said pitch.

12. [A chemical supply system described in claim 1, characterized by comprising] The chemical supply system of claim 1, further comprising a mixing means for producing a rotational flow in said mixture solution to stir and uniformize said mixture solution;

wherein[, in] said mixing means[,] includes a flowing-in portion [to said mixing means in said piping system] and a flowing-out portion [are provided to be] that are slightly offset.

13. (Amended) [A chemical supply system described in claim 1, characterized in that] The chemical supply system of claim 1, wherein:

said chemical reservoir [is constructed by having] includes a main reservoir in which a sufficient quantity of said liquid chemical is stored, and an auxiliary reservoir [which is] connected to said main reservoir and to which only a necessary quantity of said liquid chemical is supplied [to] from said main reservoir[,]; and

said auxiliary reservoir has a liquid surface level regulation means for regulating [the] a liquid surface level of said liquid chemical supplied to control a [said] chemical quantity in said chemical reservoir.

14. (Amended) [A chemical supply system described in claim 13, characterized in that] The chemical supply system of claim 1, wherein said liquid surface level regulation means [is] comprises a pair of bar-like sensors made of conductive members, and wherein said liquid surface level regulation means calculates said liquid surface level and [the] a changing speed thereof by measuring [the] an electrostatic capacity of [the dipped] portions of said bar-like sensors dipped in [the] said liquid chemical and [its] a change of said electrostatic capacity over time.

15. (Amended) [A chemical supply system described in claim 1, characterized in that said piping system has a connecting tube branching from a portion corresponding to the upstream of said solvent of the connection portion to said chemical supply means, said connecting tube is connected to said chemical supply means to form a closed system, and,]

The chemical supply system of claim 1, further comprising:

a connecting flow passage connecting said piping system and said chemical supply means;

a connecting tube branching from a portion of said piping system upstream of said connecting flow passage, wherein said connecting tube is connected to said chemical supply means to form a closed system, and wherein [when said chemical reservoir is unused,] said solvent flows [is made to flow] in said closed system to defoam when said chemical reservoir is unused.